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Research Act of 1990

Annual Report
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BACKGROUND

THE DEPARTMENT OF ENERGY METAL CASTING COMPETITIVENESS RESEARCH ACT

By the late 1970s, the metal casting industry achieved record production levels. Since that time, the number of foundries has decreased by over 26 percent while production levels have dropped by more than 35 percent from a high of almost 20 million tons shipped annually in the late 1970s to 13 million tons in 1994.

These declines have attributed to increased competition from foreign firms as well as environmental, health, and safety regulations which increased the cost of U.S.-produced castings.

To improve the competitive position of domestic metal casters, the U.S. Congress enacted the Department of Energy Metal Casting Competitiveness Research Act of 1990 (the Act) on October 15 of that year (Public Law 101-425, 104 Stat. 915, 15 U.S.C. §5301-09). The Act required the Secretary of Energy:

- C to establish a Metal Casting Competitiveness Research Program for the purpose of performing and promoting the performance of research and development on issues related to the technology competitiveness and energy efficiency of the U.S. metal casting industry;*
- C to establish an Industrial Advisory Board to provide guidance and oversight in ... [the] operation of the program; and*
- C to submit an annual report to Congress in the form of a detailed review of the progress of the research and development activities authorized under [the Act].*

As directed, the Secretary of Energy established the Metal Casting Competitiveness Research Program. The Program functions under the auspices of the Office of Industrial Technologies (OIT) within the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. The OIT is responsible for the development, implementation and management of the Program. The goals of the OIT Program are to:

- C research high priority technologies as identified by the Metal Casting Industrial Advisory Board,*
- C expeditiously transfer research results directly to the foundry floor, and*
- C to establish Centers for conducting Metal Casting Competitiveness Research. This activity covers the solicitation of proposals in metal casting to comply with the Act. Proposed projects must identify university-based research that supports the competitiveness and energy efficiency in the United States metal casting industry while targeting those areas identified by the Industrial Advisory Board on metal casting.*

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METAL CASTING INDUSTRY VISION

The metal casting industry and the Metal Casting Competitiveness Research Program are working together to build a stronger, more competitive U.S. industry through the development of an industry vision entitled, *Beyond 2000: A Vision for the American Metal Casting Industry* (the Vision). The goal is to develop a partnering process between the federal government and industry to improve the productivity, energy efficiency and competitiveness of the industry.

In September 1995, chief executive officers and presidents from the foundry, die casting, and foundry supply industries developed the Vision. The Vision development demonstrates the commitment of industry members to join forces for increasing the global competitiveness of the U.S. metal casting industry. The Act identified four general areas for research. These included: solidification and casting technologies; computational modeling and design; processing technologies and design for energy efficiency, material conservation, environmental protection and industrial productivity; and other areas of important research (P.L. 101-425, Section 5(d)). Using these general areas as a guide, the Vision provides a framework for addressing industry needs in six important areas:

- C production efficiency
- C recycling
- C pollution prevention
- C application development
- C process control
- C new technology development

Specific industry goals were also identified in the Vision. These are:

- C To increase market development activities. These activities should help to improve market share in existing markets (by as much as 10 percent), recapture lost markets (by 25-50 percent), and increase new market entries.
- C To develop materials technologies by improving the variety, the integrity, and the performance of cast metal products.
- C To develop advanced manufacturing technologies. These technologies will increase productivity by 15 percent, reduce average lead time by 50 percent, and reduce energy consumption by 3-5 percent.
- C To develop environmental technologies. Environmental goals are: to achieve 100 percent pre- and post-consumer recycling; 75 percent beneficial reuse of foundry by-products; and the complete elimination of waste streams.

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- C To renew emphasis on human resources, education, and training. The industry seeks to attract talented individuals and to train employees with the latest technologies and manufacturing techniques.
- C To increase industry reinvestment in research, education, and marketing programs by 10 percent.
- C To encourage partnerships and collaborations which combine the experience, resources, and knowledge available in public and private sector organizations.

The Vision also identifies specific areas of research to assist the industry in meeting the challenges it faces. Industry has stated that a collaborative effort between research institutions, metal casting professional societies, the industry, and government agencies is the best way to achieve these goals.

In 1991, representatives of the three largest metal casting societies formed the Cast Metals Coalition (CMC). The coalition members include the American Foundrymen's Society (AFS), the Steel Founders' Society of America (SFSA) and the North American Die Casting Association (NADCA). The CMC is a non-profit organization working with industry and research institutions, including universities and national laboratories, to identify metal casting research, development and demonstration (RD&D) for subsequent fiscal year funding. For 1996, projects were selected on the basis of the metal casting industry Vision, Public Law 101-425 requirements, and the research priorities set by the Metal Casting Industrial Advisory Board.

COMPETITIVENESS

An overview of the U.S. metal casting industry and its status in world markets is provided below.

The U.S. Metal Casting Industry

In 1994, the U.S. metal casting industry produced over 13 million metric tons of castings with a value exceeding \$23 billion. Ductile and gray iron, and aluminum castings contributed the most to this value with \$14 billion and \$9 billion, respectively. Seventy-seven percent of the U.S. total tonnage capacity is in ten states: Ohio, Alabama, Wisconsin, Illinois, Indiana, Michigan, Pennsylvania, Virginia, Tennessee, and Texas. Foundries from these and other states produce a large and diverse array of products, ranging from artificial heart valves to propellers for aircraft carriers.

The industry is composed of nearly 3,100 foundries manufacturing metal products using a variety of casting processes, the most common of which are sand casting, permanent mold casting, die casting, and investment mold casting. As illustrated in Exhibit 1, three states -- California, Pennsylvania and Ohio -- each have more than 200 foundries within their borders. Six states have 100 to 200 foundries. Of the remaining 41 states, all but Hawaii have at least one